# Firm Behavior

Cost of Production

# Ownership and management of firms

A firm

The firm’s goal is assumed to be

Explicit costs

Implicit costs

Total cost (total economic cost)

# Explicit vs. Implicit Costs: An Example

You need $100,000 to start your business.
The interest rate is 5%.

Case 1: borrow $100,000

explicit cost =

Case 2: use $40,000 of your savings,
borrow the other $60,000

explicit cost =

implicit cost =

# Economic Profit  vs. Accounting Profit

Accounting profit

Economic profit

# A C T I V E  L E A R N I N G  2
# Economic profit vs. accounting profit

The equilibrium rent on office space has just increased by $500/month.

Compare the effects on accounting profit and economic profit if

a. you rent your office space
b. you own your office space

Short run

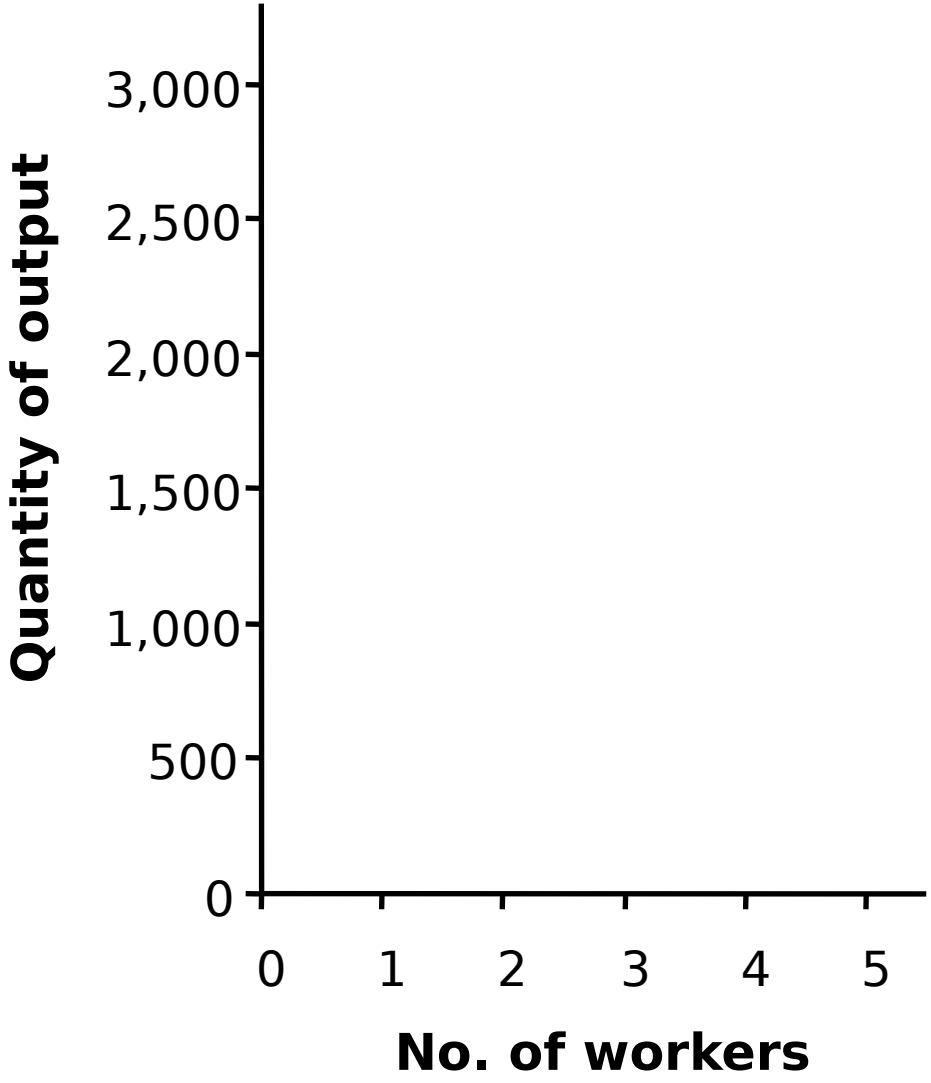
Long run

# The Production Function

A production function

# Example 1: Farmer Jack's Production Function

| ***L*** (no. of workers) | ***Q*** (bushels of wheat) |
|---|---|
| 0 | 0 |
| 1 | 1000 |
| 2 | 1800 |
| 3 | 2400 |
| 4 | 2800 |
| 5 | 3000 |



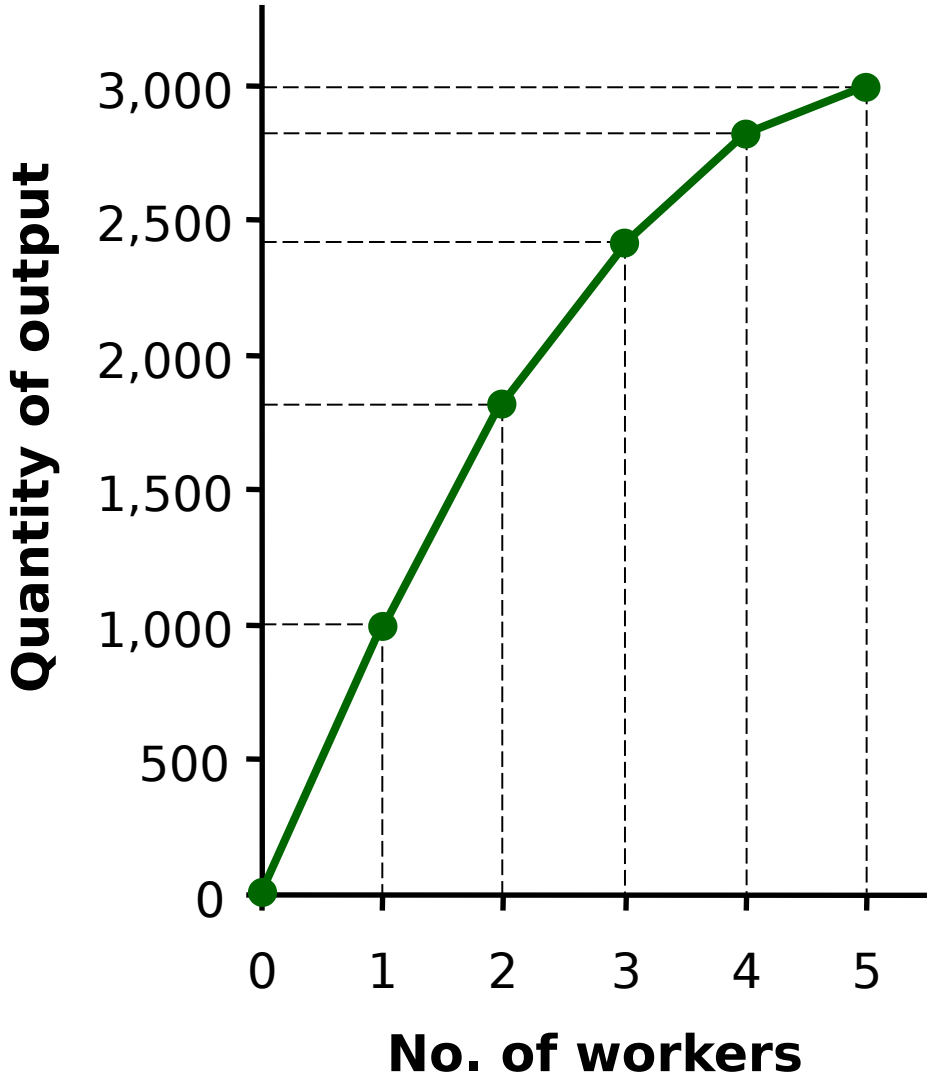
# Marginal  and Average Product

The marginal product

Average product

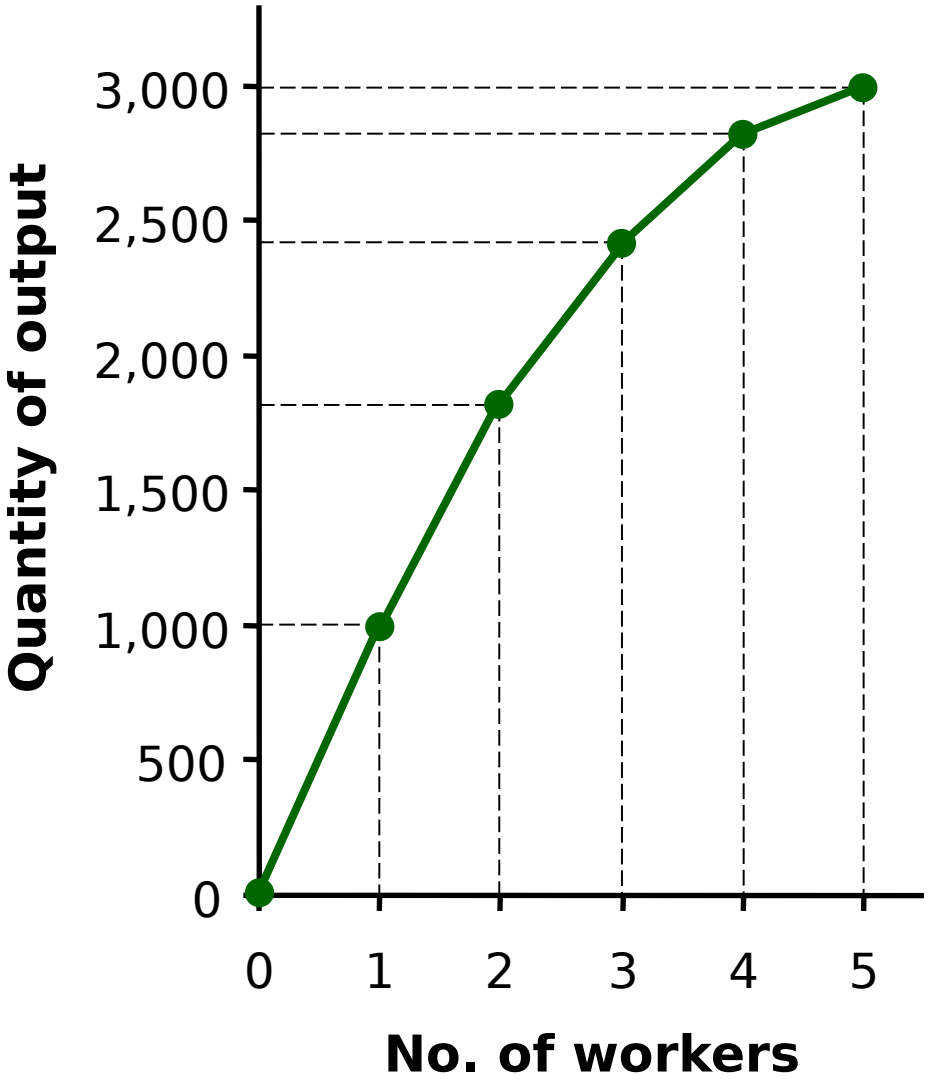
# EXAMPLE 1: Total & Marginal Product

| ***L*** (no. of workers) | ***Q*** (bushels of wheat) | *MPL* |
|---|---|---|
| 0 | 0 | |
| 1 | 1000 | |
| 2 | 1800 | |
| 3 | 2400 | |
| 4 | 2800 | |
| 5 | 3000 | |



# EXAMPLE 1: Total & Average Product

| ***L*** (no. of workers) | ***Q*** (bushels of wheat) | *APL* |
|---|---|---|
| 0 | 0 | |
| 1 | 1000 | |
| 2 | 1800 | |
| 3 | 2400 | |
| 4 | 2800 | |
| 5 | 3000 | |

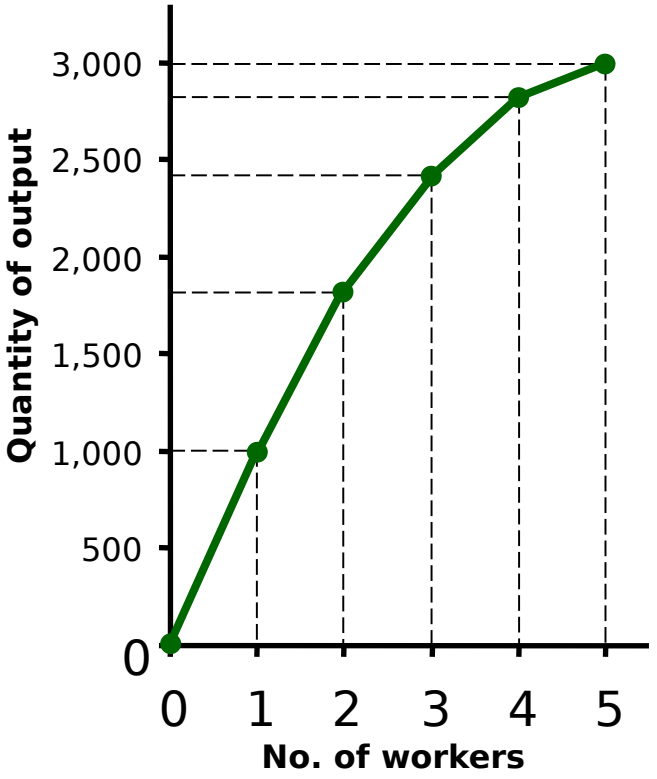


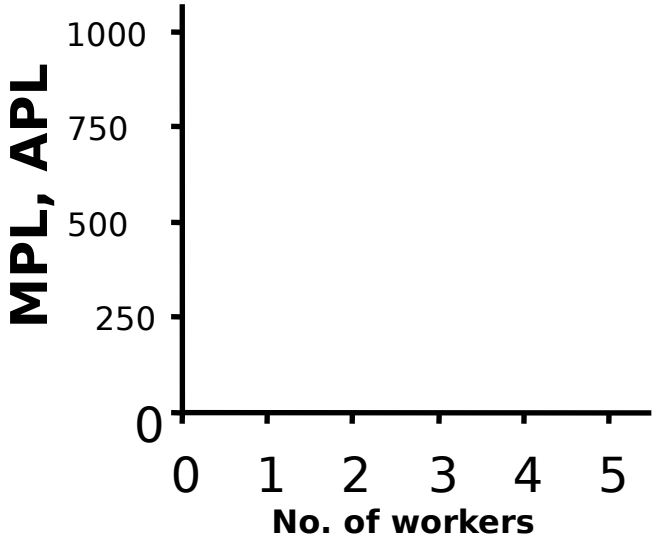
When MPL>APL,

When MPL=APL,

When MPL<APL,

| L | Q | MPL | APL |
|---|---|---|---|
| 0 | 0 | - | - |
| 1 | 1000 | 1000 | 1000 |
| 2 | 1800 | 800 | 900 |
| 3 | 2400 | 600 | 800 |
| 4 | 2800 | 400 | 700 |



# Why MPL Diminishes

Farmer Jack's output rises by a smaller and smaller amount for each additional worker. Why?

Diminishing marginal product:

# Long-run production: Two variable inputs

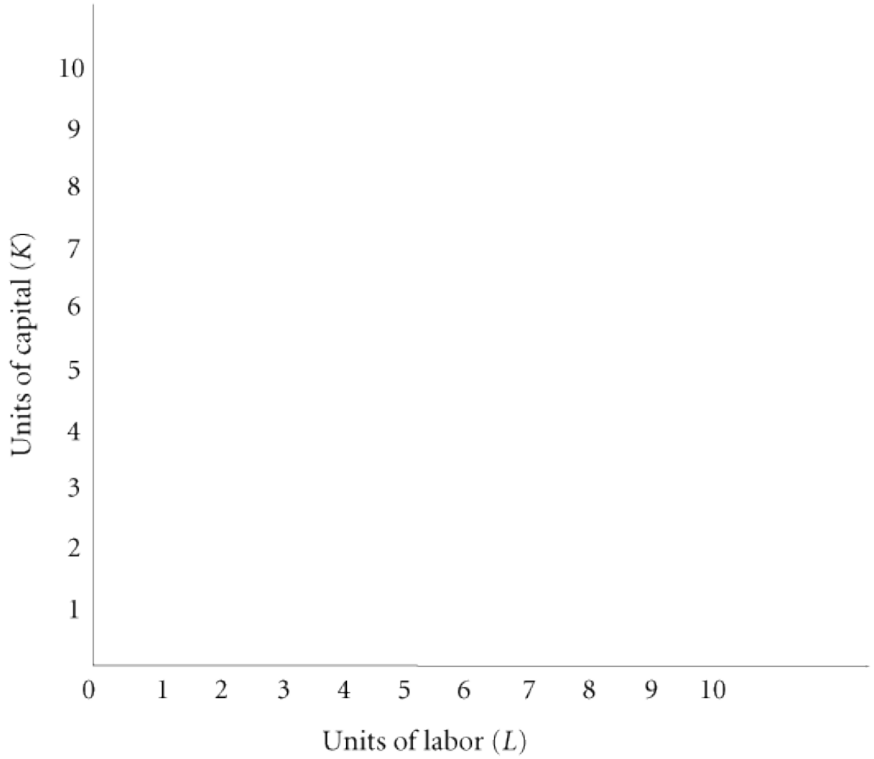
In the long run, both capital and labor are variable. A firm can usually produce a given level of output by varying the amounts of each that they use.

**Inputs Required to Produce 100 Diapers Using Alternative Technologies**

| TECHNOLOGY | UNITS OF CAPITAL (*K*) | UNITS OF LABOR (*L*) |
|---|---|---|
| A | 2 | 10 |
| B | 3 | 6 |
| C | 4 | 4 |
| D | 6 | 3 |
| E | 10 | 2 |

| (1) TECHNOLOGY | (2) UNITS OF CAPITAL ($K$) | (3) UNITS OF LABOR ($L$) | (4) COST $P_L = \$1$ $P_K = \$1$ | (5) $P_L = \$5$ $P_K = \$1$ |
|---|---|---|---|---|
| *A* | 2 | 10 | | |
| *B* | 3 | 6 | | |
| *C* | 4 | 4 | | |
| *D* | 6 | 3 | | |
| *E* | 10 | 2 | | |

# Isoquant

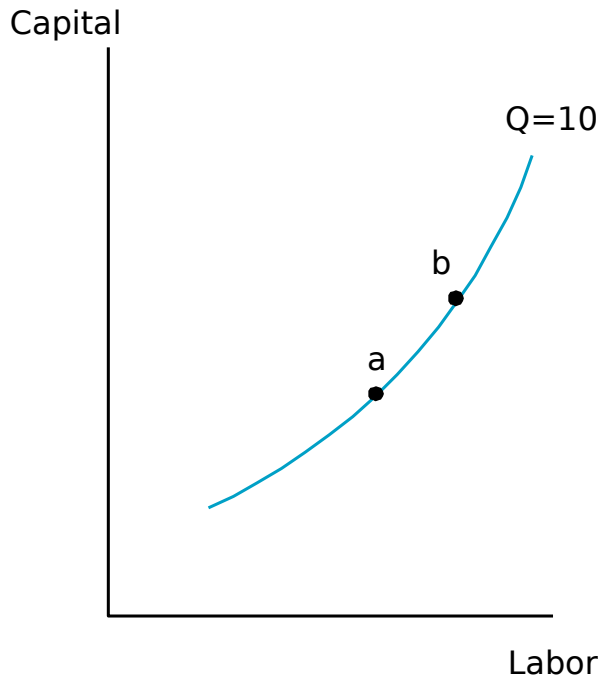



**Alternative Combinations of Capital (*K*) and Labor (*L*) Required to Produce 50, 100, and 150 Units of Output**

| | $Q_X = 50$ | | $Q_X = 100$ | | $Q_X = 150$ | |
|---|---|---|---|---|---|---|
| | ***K*** | ***L*** | ***K*** | ***L*** | ***K*** | ***L*** |
| *A* | 1 | 8 | 2 | 10 | 3 | 10 |
| *B* | 2 | 5 | 3 | 6 | 4 | 7 |
| *C* | 3 | 3 | 4 | 4 | 5 | 5 |
| *D* | 5 | 2 | 6 | 3 | 7 | 4 |
| *E* | 8 | 1 | 10 | 2 | 10 | 3 |

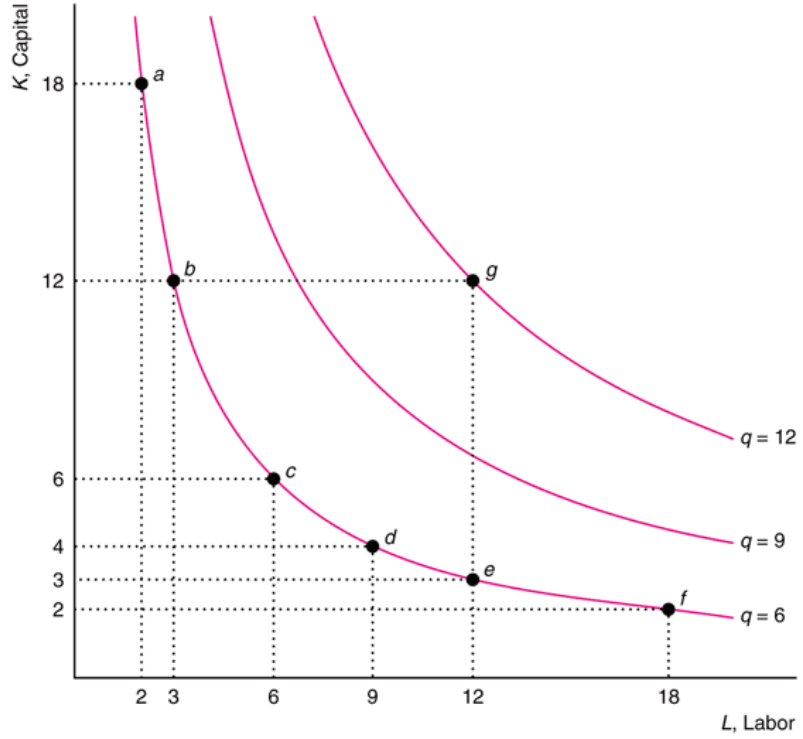
# Properties of Isoquants

## Isoquants slope downwards



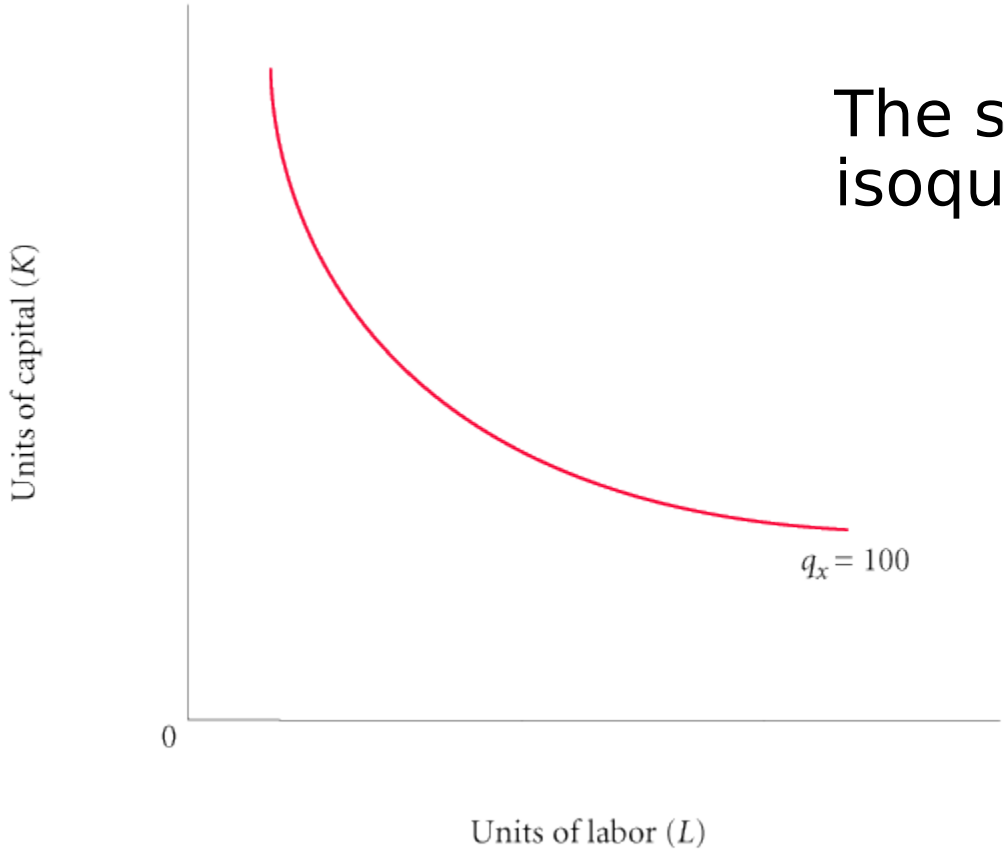
# Properties of Isoquants

The farther an isoquant is from the origin, the greater the level of output.



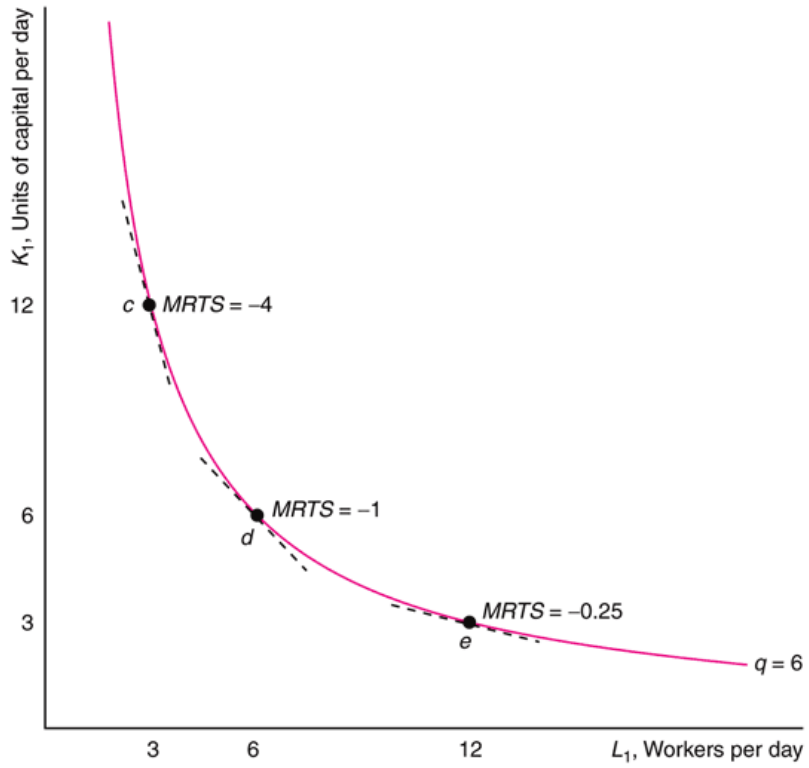
# Isoquants

# Isoquants




The slope of an isoquant is

# Properties of Isoquants




Isoquants generally are convex,

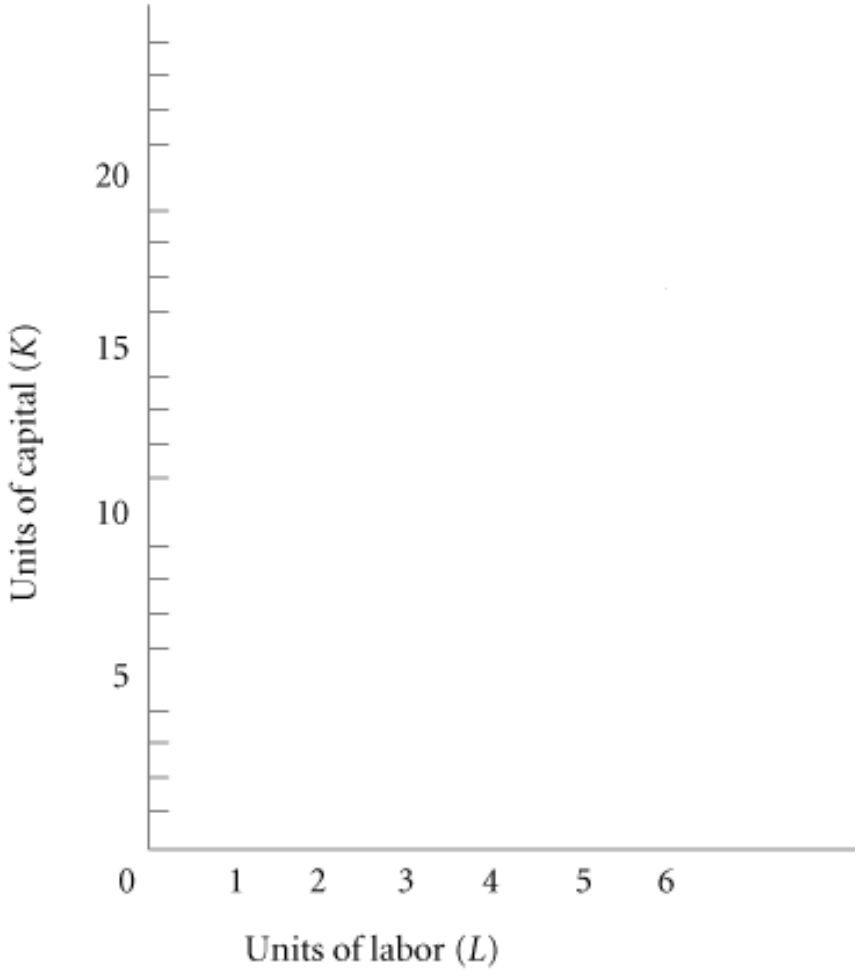
# The cost minimization problem

Cost minimization problem-

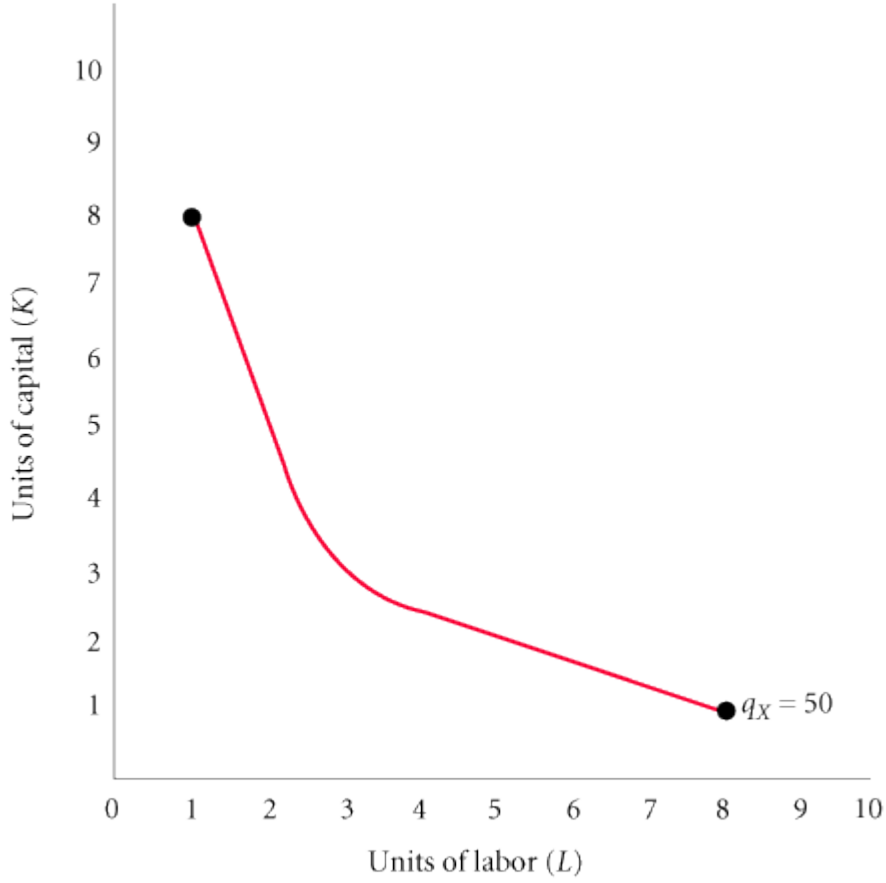
Isocost line-

# Isocost lines

Assume that the price of labor is $5, the price of capital is $1, and the firm has $25 to spend.



# Cost minimization



# Cost minimization

Suppose the firm's production function is given by:

So the marginal products are given by:

The price of labor is $5 per unit and the price of capital is $20/unit. What is the cost minimizing input combination if the firm wants to produce 1,000 units per year?